DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1890
WILMINGTON, NORTH CAROLINA 28402-1890

IN REPLY REFER TO

May 30, 2008

Environmental Resources Section

Dear Madam or Sir:

Enclosed for your review and comment is a copy of the Environmental Assessment, B. Everett Jordan Dam and Lake, North Carolina, Drought Contingency Plan (Revised 2008), dated May 2008. The Environmental Assessment has been prepared in accordance with the Council on Environmental Quality and the U.S. Army Corps of Engineers' regulations implementing the National Environmental Policy Act of 1969 (33 CFR 230), as amended.

Based on the information in the Environmental Assessment, we expect that the proposed Federal action will not significantly affect the quality of the human environment; therefore, an Environmental Impact Statement will not be prepared. If this opinion is upheld following circulation of this Environmental Assessment, a Finding of No Significant Impact (FONSI) will be signed and circulated.

In order to ensure full consideration of all comments, we are requesting that written comments be mailed to arrive at our office no later than June 30, 2008. If you have any questions concerning this matter, please contact Mr. Stacy Samuelson, Environmental Resources section, at (910) 251-4480.

Sincerely,

W. Coleman Long
Chief, Planning and
Environmental Branch

Enclosure

US ARMY CORPS
of ENGINEERS
WILMINGTON DISTRICT

ENVIRONMENTAL ASSESSMENT

B. Everett Jordan Dam and Lake, North Carolina

Drought Contingency Plan (Revised 2008)

May 2008

Environmental Assessment
B. Everett Jordan Dam and Lake, North Carolina
Drought Contingency Plan (Revised 2008)

May 2008

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Appendices:

1.00 NEED FOR AND OBJECTIVES OF ACTION

The National Environmental Policy Act of 1969, as amended (NEPA), requires consideration of the environmental impacts for major federal actions. The purpose of this Environmental Assessment (EA) is to ensure the environmental consequences of the proposed action are considered and that environmental and project information are available to the public. This EA has been prepared pursuant to NEPA in accordance with the Council on Environmental Quality (CEQ) regulations as contained in 40 CFR Parts 1500 to 1508, which directs federal agencies on how to implement the provisions of NEPA.

Several recent drought events (during 1998, 2001, 2002, 2005, 2006, and 2007) have necessitated deviations from the 1991 Drought Contingency Plan. Approval from the Commander, South Atlantic Division (SAD) for a temporary deviation from the 1991 Drought Contingency Plan requires a time consuming process of technical analysis and coordination with stakeholders, internal coordination and finally, a detailed presentation of the proposed deviation to SAD. This process delays and limits the response to drought conditions.

Currently, North Carolina is experiencing conditions that may become a significant drought of record. Long-term regional forecasts for the area predict below normal rainfalls due to La Niña conditions over the Pacific Ocean, which typically result in dry conditions in the southeast U.S. Continued dry conditions may result in depletion of the water quality storage pool, potentially necessitating reduction of water quality releases to minimums. To address the potential for depletion of the water quality storage pool, the drought contingency plan will address potential use of sediment storage capacity for meeting water quality needs in periods of extreme drought.

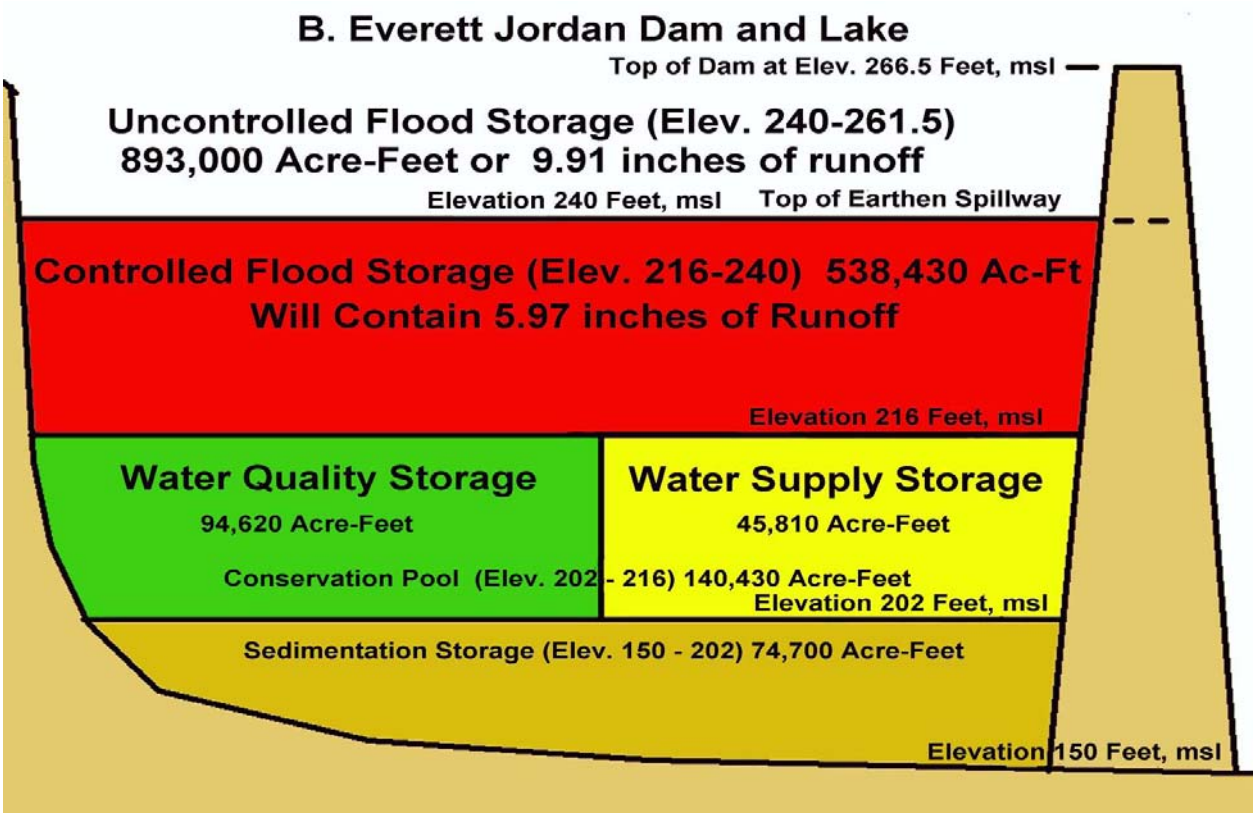
The sediment pool is the portion of the lake between 150 feet, msl and 202 feet, msl. The amount of storage currently available in the sediment pool is approximately 74,700 acre-feet. Sediment storage is built in the original lake design to account for sediment inputs from tributary rivers and streams for the planned life of the project. To date, sediment inputs have been less than forecast during initial planning.

The object of implementing the revised drought contingency plan at Jordan Lake is to be more responsive to drought events in the Cape Fear River Watershed. The 1991 plan (Appendix A), approved in February 1991 is implemented at lower lake levels than the proposed plan. The 1991 plan is implemented when levels in Jordan Lake fall to 45 percent of either the water supply or water quality pools. If drought conditions continue until only 23 percent of the storage available remains, then water conservation recommendations can be made. The proposed drought contingency plan would be implemented when water quality storage falls to 80 percent.

During the recent droughts, collaborative adaptive management strategies and changes in the plan were co-developed by the Wilmington District, U.S. Army Corps of Engineers and key local, State and Federal stakeholders and then had to be approved by SAD as a deviation to normal operation. A deviation was implemented during the 2007 drought period. Information gained in each of those years has improved drought management strategies and increased dependability of the conservation pool storage in Jordan Lake and are incorporated in the

proposed drought contingency plan. The 2007 deviation had the advantage of being field monitored and could be altered to safer flow levels if cutbacks produced undesirable flow conditions downstream.

The conservation pool in Jordan Lake extends from lake elevations 202 to 216 feet, mean sea level (msl). The conservation pool has 140,430 acre-feet (note that 1 acre-foot of water equals about 325,853 gallons) of storage subdivided into two major volumes of water. The first volume of water is used for water supply and has 45,810 acre-feet. The second volume of water is for making water quality releases to meet a low flow target downstream at Lillington of 600 cubic feet per second (cfs), +/- 50 cfs. The water quality pool has 94,620 acre-feet of water. Storage remaining in both the water supply pool and the water quality pool is tracked whenever the lake level falls below 216 feet, msl daily using standard accounting principles.



The current approved Drought Contingency Plan for Jordan Lake was developed in February 1991 using experience and guidance available at that time, and was based upon the serious droughts of the early 1930's and 1940's. The 1991 plan begins drought accounting at the Jordan Lake 216-feet msl level and drought planning starts when Jordan Lake falls into Zone D. (See Appendix A, B-8). Normal operations of meeting the downstream flow target at Lillington of 600 cfs +/- 50 cfs are continued until either water quality or water supply is 23 percent remaining. At 23 percent remaining of either water supply or water quality storage, conservation measures are advised to the responsible agency by the Wilmington District.

Table 1 summarizes the trigger points and actions to be taken in the 1991 Drought Contingency Plan.

Table 1: Trigger Points for 1991 Drought Contingency Plan

Jordan Lake Level (feet, msl)	Water Quality or Supply Storage Remaining (%)	Jordan Dam Minimum Release (cfs)	Lillington Daily Average Flow Target (cfs)	Action Item	Suggested Water Supply Conservation Status
207-210	> 23	40	600 +/- 50	Increase awareness	Normal
< 207	> 23	40	600 +/- 50	Convene Drought Management Committee to determine courses of action	Voluntary
< 207	< 23	TBD	TBD	Determine needed target flows and action items	Mandatory
< 202	< 0	TBD	TBD	Consult and develop actions to be taken	Emergency

Note: TBD means To Be Determined

Deficiencies in the 1991 plan were noted in dry periods in the mid- and latter 1990's. A major deficiency is using lake level instead of water supply or water quality storage remaining as an indicator of actions to be taken or as a measure of the seriousness of drought conditions. The 1991 plan assumes full utilization of the water supply storage in Jordan Lake. However, water supply storage is currently about 55 percent allocated, but even this allocation is not fully utilized. As a result, water supply storage remaining in a drought can be near 100 percent remaining while water quality storage is at low levels. This produces misleading and artificially higher lake levels than used in the plan. In recent droughts, Jordan Lake was above any action level but water quality storage remaining was low (e.g. 210 feet msl, and 30 percent water quality storage (Appendix A, p. B-8)). Even if water supply were fully allocated and fully utilized, reaction at 23 percent remaining is too late for effective drought management based upon current knowledge.

Table 2 shows the minimum level of Jordan Lake and minimum water quality storage remaining in several droughts. If the 1991 plan had been followed in 2002 without a deviation, water quality storage is estimated to have been exhausted instead of the 23 percent remaining as shown in the table. The deviation was a temporary change in the existing drought operations needed to minimize the risk of depletion of the water quality storage in Jordan Lake.

Table 2: Minimum Water Quality Storage Remaining and Low Lake Levels in Some Past Droughts

Date	Jordan Lake Minimum WQ Storage Percent Remaining	Jordan Lake Level Feet, MSL
22 Oct. 1983	11	208.90
4 Aug. 1986	14	209.95
16 Oct. 1986	1	207.85
6 Sep. 1987	50	212.33
27 Nov. 1987	30	210.63
28 Aug. 1988	26	210.25
6 Oct. 1989	19	209.99
26 Nov. 1993	32	210.84
10 Dec. 1998	27*	210.33
24 Aug. 1999	53*	212.56
15 Dec. 2000	57*	212.95
5 Jan. 2002	31*	210.74
22 July 2002	23*	209.87
20 Nov. 2005	48*	212.14
24 Oct. 2007	30*	210.19

* Using deviation requests.

In recent droughts, collaborative adaptive management strategies and changes in the plan had to be co-developed by the Wilmington District and key local, State and Federal stakeholders and then requested as deviations. Deviations were applied to the 1998, 2001, 2002, 2005, 2006 and 2007 drought periods. Information gained in each of those years has improved drought management strategies and increased dependability of the storage in Jordan Lake. These deviations had the strength of being field monitored and could be altered to safer flow levels if cutbacks produced undesirable flow conditions downstream. A summary of triggers, Jordan Dam releases and flow targets in previous deviations is shown later in this report.

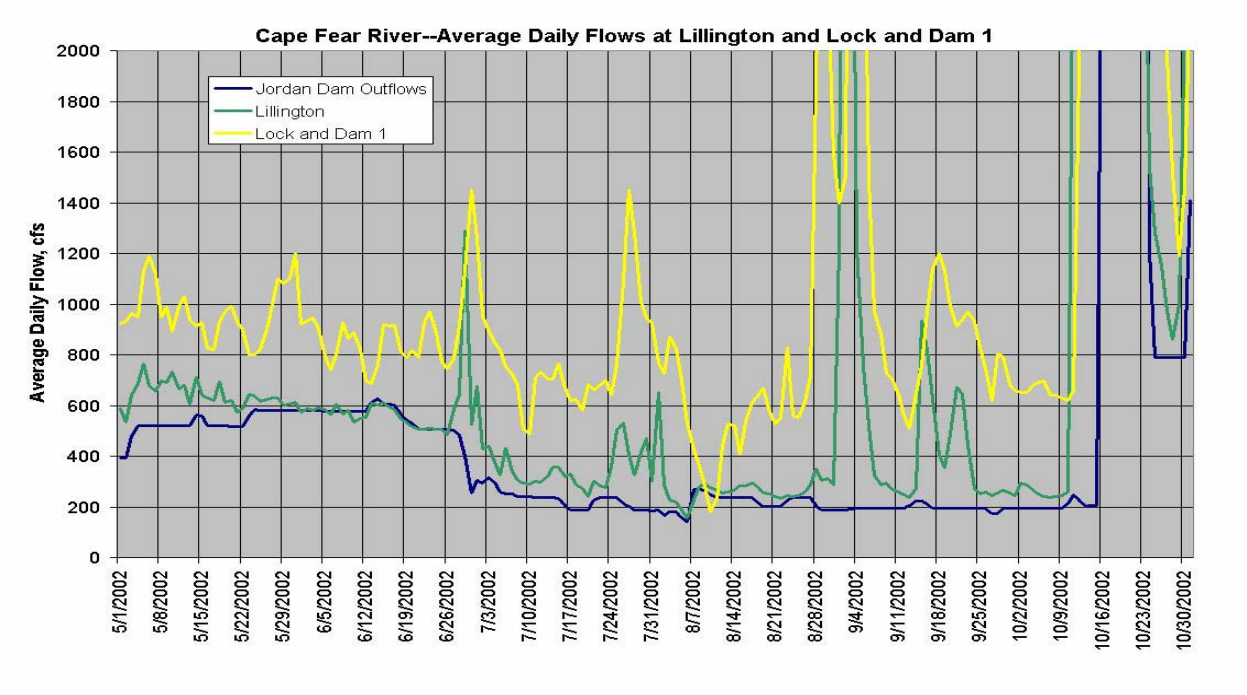
Recent and Proposed Drought Management Actions

Table 3 below summarizes adjusted downstream flow targets at Lillington that were dependent upon water quality storage remaining in the 1998, 2001, 2002, 2005, 2006 and 2007 droughts. **The key lesson learned is that increased pro-activity was beneficial in drought management.**

Table 3: Flow Targets

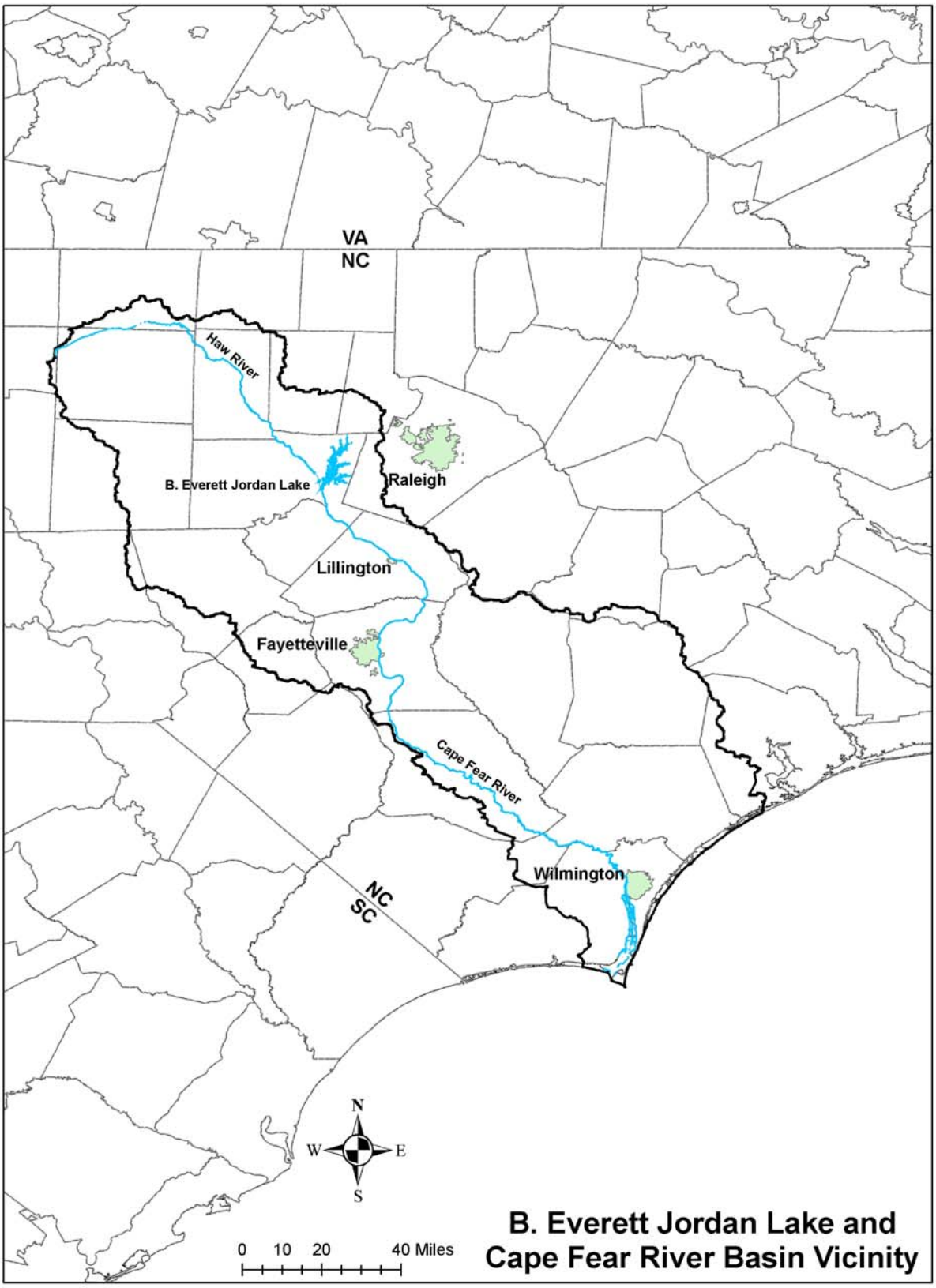
Daily Average Flow Target, cfs at Lillington	%WQ Storage Remaining in Jordan Lake					
	1998	2001	2002	2005	2006	2007
500 cfs (+/- 50 cfs)	42	50	53	70	80	80
400 cfs (+/- 50 cfs)	32	40	42	63	70	62
350 cfs (+/- 50 cfs)		41	58	60	--	58
300 cfs (+/- 25 cfs)	31	--	40	--	50	47
275 cfs (+/- 25 cfs)	--	--	38	55	45	44
250 cfs (+/- 25 cfs)	--	--	35	50	40	42
200 cfs (+/- 25 cfs)	--	--	33	--	30	38

The 2002 and 1998 droughts were the most severe, and helped define low flow release requirements from Jordan Dam. This drought also tested downstream flow limits and determined thresholds to observe in future droughts. The plot below shows that releases from Jordan Dam (shown in blue) were close to 200 cfs from early July 2002 to mid-October. This produced flows at Lillington, shown in green, ranging near 250 to 300 cfs on many days. Flows much further downstream at Lock and Dam 1, shown in yellow, were typically much higher (500 to 800 cfs flow range). A drop in releases to near 140 cfs from Jordan Dam on 6 August 2002, due to mechanical issues with one of the two service gates at Jordan Dam, produced flows at Lillington of near 160 cfs. This low flow helped define low flow thresholds in the Cape Fear River for water supply intakes in the Lillington/Harnett County area. No major issues were noted other than algal blooms in the river reach between locks 2 and 3 that were overall nuisance issues.



2.00 AUTHORIZATION

Construction of the B. Everett Jordan Dam and Lake Project was authorized by Public Law 88-253 by the 88th Congress on 30 December 1963 for flood control, recreation, fish and wildlife enhancement, and streamflow regulation for water supply and water quality control. Drought Contingency Plans are required for Corps projects by Engineer Manual 1110-2-3600, Engineering and Design, Management of Water Control Systems Section 7.7; Engineer Regulation 1110-2-240, Engineering and Design, Water Control Management; and Engineer Regulation 1110-2-1941, Engineering and Design, Drought Contingency Plans. The current study reflects the required update of the drought contingency plan to address changes made to better manage future droughts based on recent drought events.


VA
NC
Haw River
B. Everett Jordan Lake
Raleigh
Lillington
Fayetteville
Cape Fear River
Wilmington
NC
SC
N
W
E
S
0 10 20 40 Miles
B. Everett Jordan Lake and
Cape Fear River Basin Vicinity

3.00 ALTERNATIVES

The following sections present and briefly discuss the alternatives to the Proposed Drought Contingency Plan that were analyzed. The analysis of each alternative looked at the potential to meet the plan's purpose and need while minimizing the potential adverse effects to the human environment. The alternatives investigated were:

- Proposed Drought Contingency Plan
- No Action – 1991 Plan

Proposed Drought Contingency Plan

The proposed Drought Contingency Plan has been developed and refined through the deviation process with SAD over the past five years. The purpose of the present action is to take the learned experiences of recent droughts and revise the Drought Contingency Plan to allow a more responsive drought management of B. Everett Jordan Lake. The proposed Drought Contingency Plan consists of the following elements:

- Continued coordination with major stakeholders.
- Staged, earlier response to drought conditions.
- Maintenance of target flows at Lillington, North Carolina.
- Emergency surplus reallocation of available sediment pool storage.

The proposed Drought Contingency Plan focuses on waters contained in the Conservation Pool of Jordan Lake. The Conservation Pool is the storage area between lake levels of 202 and 216 feet, msl and contains water to meet Congressionally approved project commitments. The proposed plan of increased coordination and consultation with stakeholders will be implemented when either the water supply or water quality pool storage declines to 80 percent remaining (compare to 45 percent remaining under the 1991 plan). Additionally, dependent upon climate forecasts and projections of storages remaining, water conservation measures can also be recommended at that time, versus the 23 percent remaining that is in the 1991 plan. Due to capacity and outflow requirements, the water quality pool is the controlling entity in management of the lake levels. The proposed drought release schedule from Jordan Dam is listed in Table 4 below:

Table 4: Drought Release Schedule

Drought Level	Water Quality Storage Remaining (%)	Jordan Dam Minimum Release (cfs)	Jordan Dam Maximum Release (cfs)	Lillington Daily Average Flow Target (cfs)	Suggested Water Supply Conservation Status
0	>= 80	40	600	600 +/- 50	Normal
1	60 – 80	40	Lillington target	450 - 600 +/- 50	Voluntary
2	40 – 60	40	Lillington target	300 - 450 +/- 50	Mandatory
3	20 – 40	200		None**	Mandatory, but Emergency at 30%
4	00 – 20	100*		None**	Emergency

* Releases may be increased to 200 cfs if water supply has been reallocated to water quality storage.
** Lillington flow will be total of Jordan Dam release plus local inflow.

Drought level 0 in the table above is considered to be within normal operating parameters. The response in drought levels 1 and 2 is for key stakeholders including local Counties, State and Federal agencies and others to collectively determine the flow target that is needed at Lillington in response to field reconnaissance conditions and to the water quality storage remaining. The response in drought levels 3 and 4 is for more serious drought conditions and is based upon learned successful drought management strategies that were used in the very serious 2002 and later drought events. This strategy requires a constant release from Jordan Dam, which combined with local inflows, will produce total flows at Lillington and other downstream points that will be monitored for water quality conditions. As conditions allow, the transition between drought levels listed in Table 4 will be made considering conservation pool storage, watershed inflows, precipitation forecasts, or other factors with appropriate consultation with affected stakeholders.

Section 6 of the Flood Control Act of 1944 (PL 78-534), as amended, allows the Corps to temporarily reallocate available surplus storage for water supply purposes. The proposed drought contingency plan update would allow declaration of any available sediment pool storage as surplus storage should the water quality storage pool be depleted. Upon declaration as temporary surplus storage, the State of North Carolina would be allowed to contract for use of sediment pool storage for water supply purposes. The contract would be for up to 60,000 acre feet of the available sediment pool storage. The contract agreement would have to be approved by both the State of North Carolina, and the Assistant Secretary of the Army (ASA) or their designee. During the current exceptional drought, B. Everett Jordan Dam has been managed by the Corps, guided by consultation with interested parties such as the City of Fayetteville, City of Wilmington, the Brunswick County Water and Sewer Authority, other downstream water users, and resource agencies. The Corps has followed a strategy of releasing only enough water to allow downstream water intakes to remain functional and to maintain adequate water quality. The release from B. Everett Jordan Dam has been reviewed and adjusted as needed. This strategy benefits both in-reservoir water users and downstream water users and environmental

interests by conserving water in Jordan Lake and greatly reducing the risk of running out. The State of North Carolina will continue this general strategy, supported by frequent stakeholder consultation, if it becomes necessary to use water from the sediment pool (Mr. John Morris, NCDENR, Personal Communication, January 17, 2008). Water users from the reservoir area and those downstream will be expected to mandate very strict water use restrictions. Under the proposed plan, temporary reallocation of the sediment pool storage for water supply purposes may allow for minimum releases to help meet downstream water supply requirements.

The proposed drought contingency plan (Appendix B) has been developed collaboratively between stakeholders, State agencies and Federal agencies over the past ten years. Using data collected during recent drought events and modeling on the Cape Fear River basin, the proposed plan is more proactive toward drought events than the 1991 plan. The proposed plan would be implemented when water quality storage levels fall below 80 percent (75,696 acre-feet). A water budget will be implemented when the lake level falls below 216 feet, msl. In addition to responding earlier in a drought event, the proposed plan provides for suggestion of water conservation measures at several levels rather than waiting until the 23 percent level under the 1991 plan.

No Action Plan – 1991 Plan

The No Action Plan involves the continued use of the 1991 Drought Contingency Plan (Appendix A). The existing plan is not implemented until lake levels reach Zone C of Exhibit 1 in Appendix A. These levels are approximately between 210 and 207 feet msl, with allowance of even lower levels during the months of January and February. Recommendation that implementation of water conservation should be considered does not occur until 23 percent water quality or water supply pool remaining – allowing less flexibility during prolonged drought conditions. Recent drought events have given rise to the need for coordination of Deviation Requests with SAD to allow earlier response to conditions. Continued implementation of the current plan could potentially, as the drought deepens, have negative effects in the future on target streamflows at the Lillington stream gage on the Cape Fear River and indirectly on downstream water supply users. Low flow conditions under the current plan have also contributed to water quality issues downstream as evidenced by an algal bloom in the river reach between Lock and Dam #2 and Lock and Dam #3 in 2002 (Terry Brown, USACE, Personal Communication).

4.00 PROPOSED ACTION, UPDATE DROUGHT CONTINGENCY PLAN

As discussed in Section 3.00, the proposed action is to update the drought contingency plan section of the Water Management Plan for B. Everett Jordan Dam and Lake. The revised plan reflects experiences in several approved drought deviation operations of B. Everett Jordan Dam and Lake beginning in 1998. The proposed plan (Appendix B) implements drought management response measures when water quality pool levels fall below 80 percent. The plan also includes a mechanism for key stakeholders and State and Federal agencies to be involved in implementation of the plan. Through such a collaborative process, it is expected that downstream flows at Lillington will be maintained to minimize impacts to natural resources and

water supply users downstream of Jordan Lake, although actual flows are dependent on drought conditions. Inclusion of the potential reallocation of the sediment pool storage under the proposed plan further reduces risk of adverse impacts.

5.00 IMPACTS ON SIGNIFICANT RESOURCES

The proposed plan and no action alternative have as their main differences, timing of implementation and the management of risk. The risk involves running out of water quality pool storage in the reservoir prior to alleviation or end of drought conditions within the watershed. In the no action alternative, the response is deferred until later in a drought event leaving less flexibility for a response before conditions worsen or become prolonged. The proposed plan, by reacting earlier in a drought reduces the overall risk of running out of water for in- reservoir demands and water quality releases to the downstream portions of the watershed. Proposed reallocation of sediment pool storage may have beneficial effects to downstream resources, but in- reservoir resources may be adversely affected by further draw-down of lake levels. Should both the conservation and sediment pools be depleted, there is potential that run-of-river flows would result. Impacts from run-of-river flows are difficult to forecast, but generally would be negative on resources and their users throughout the watershed. Table 5 below summarizes the potential impacts to significant resources due to each alternative.

Table 5: Impacts to Resources

	Alternative	
Resource	**Proposed Drought Contingency Plan**	**No Action – 1991 Plan**
Water Supply	• Decreased risk of conservation pool depletion. • Emergency allocation of sediment pool storage. • Positive benefits to water supply users.	• Increased risk of conservation pool depletion. • Adverse impacts to water supply users due to potential conservation pool depletion.
Water Quality	• Flexibility in target flows at Lillington allows decrease to 7Q10 flows (40 cfs) later in a drought event. • Decreased risk of conservation pool depletion. • Accelerated use of sediment pool resulting in earlier run-of-river flows.	• Inflexible target flows at Lillington could cause decrease to 7Q10 (40 cfs) flows earlier in a drought event. • Increased risk of conservation pool depletion.
Fish and Wildlife	• Potential fish kills in lake due to use of sediment pool storage. • Decrease in low flow impacts.	• Increase in low flow impacts. • Downstream impacts to anadromous fish.
Endangered Species	• Increased foraging opportunities for bald eagle.	• Increased foraging opportunities for bald eagle.
Recreation	• Reduced boat ramp access. • Reduced shoreline access due to mud flats.	• Reduced boat ramp access. • Reduced shoreline access due to mud flats.
Cultural Resources	• Potential exposure of undocumented sites due to lower lake levels.	• Potential exposure of undocumented sites due to lower lake levels.
Dam Safety	• Appropriate monitoring during refilling of lake.	• Appropriate monitoring during refilling of lake.

5.01 Water Supply. The Towns of Cary, Apex and portions of Chatham County have water supply allocations for a portion (38 percent) of the conservation pool, or 45,810 acre-feet total. Downstream water supply interests are the City of Fayetteville, the Lower Cape Fear Water and Sewer Authority, the City of Wilmington and other community and industrial users. Downstream users rely on water quality release flow targets at the Lillington stream gage for adequate water supply flows in the lower Cape Fear River basin. Should the water quality or water supply pool storage be depleted during an extended drought, the proposed plan would allow emergency reallocation of available sediment pool storage as surplus for water supply use. The State of North Carolina would contract with the Corps for use of the remaining available sediment pool storage and would determine how the storage would be allocated to water supply users in the Cape Fear River basin.

Proposed Drought Contingency Plan

The proposed plan would extend the remaining water volume in the conservation pool. Implementation of reduced flows downstream of the dam at the 80 percent level of the water quality pool would allow downstream users to implement conservation measures earlier in drought events. Early implementation of drought response measures would provide for a staged reduction in downstream flows rather than the rapid, more dramatic reductions under the existing drought contingency plan. Implementation of the proposed plan would allow communities and businesses to adjust to and prepare for drought as conditions changed rather than waiting until late in the process as is currently done. This process should result in minimal, if any, negative impacts to water supply during drought conditions when compared to the 1991 plan. This proactive approach in the reduction of outflows, set by water quality percent remaining, will benefit the downstream users as a result of a gradual reduction of outflows, whereby the source of their water is extended.

No Action – 1991 Plan

Under the current plan, normal operations at the dam remain in effect until 23 percent of the water quality or water supply pool remains. This results in a reduction of outflows much later in a drought event, reducing the ability to address downstream water supply user's needs. Such reductions may not allow users to implement water conservation measures or identify alternate sources of water in a timely manner to ameliorate the effects of those measures. This may result in negative impacts to water supply users in the lower watershed. The current plan could result in negative impacts to water supply depending upon the length and severity of a drought event.

5.02 Water Quality. Outflows from the dam are such that water quality flow targets at Lillington are met. Currently, target flow reductions at Lillington, would only be implemented with SAD approval of a deviation request submitted by the Wilmington District, following consultation with stakeholders including water resource, water quality, and fisheries agencies within the State of North Carolina, Federal Agencies including the US Fish and Wildlife Service, and downstream water users.

A depletion of the water quality pool may mean that water for low flow releases may not be available. Without low flow releases, dramatic changes in downstream water quality would occur. A drop in outflows could result in reductions of dissolved oxygen, and increases in chlorophyll a, an indicator of algal blooms. These changes in downstream water quality may have significant ecological impacts. Additionally, high amounts of chlorophyll may make water treatment methods for water supply less efficient, potentially increasing costs to downstream users. Low flow conditions that may occur under the current plan could also impair mixing or dilution goals set in NPDES permits issued by NCDENR to operators of wastewater treatment plants, adversely impacting their efficient operation.

The impacts of low flow releases caused by drought are the same for both the proposed plan and the no action alternative. The difference between the alternatives is the management of the risk in getting to the situation where water for required low flow is exhausted by drought. This difference is explained in the paragraphs which follow.

Proposed Drought Contingency Plan

Gradual changes in releases early in drought events may allow the watershed to adjust to lower flows without detrimental effects. Ongoing water quality monitoring by NCDENR, DWQ will allow Corps water managers to adapt the releases to maintain water quality parameters within limits set by DWQ. The proposed drought contingency plan should extend the remaining water volume in the conservation pool and reduce the risk of depleting the water quality pool for target flows at Lillington. The proposed drought contingency plan also provides more flexibility during prolonged drought – potentially lessening affects compared to the 1991 plan.

No Action – 1991 Plan

Delay of response to drought conditions until later in an event may increase risk of depleting the water quality pool from the reservoir's conservation pool for flow targets. Project operational releases and downstream water quality conditions would remain normal for a longer period into the drought. However, once flow targets are reduced, the amount of water remaining would be less than with the proposed plan. Delayed implementation of reducing flow target releases increase the risk of depleting the water quality pool in a prolonged drought.

5.03 Fish and Wildlife Resources. Depending upon the severity of drought conditions, and the distribution of those conditions throughout the watershed, impacts to fish and wildlife resources will be variable. The temporary reduction of lake levels during drought may provide additional foraging area for upland species as the result of grasses and forbs colonizing exposed shoreline areas. These benefits would be of short duration as the lake would be refilled as drought conditions ease or are ended. Aquatic species may be impacted by crowding and increased competition for resources during reduced lake and downstream river levels.

Anadromous fish species in the Cape Fear River basin have been impeded or blocked from accessing upper reaches of the watershed by the presence of the Cape Fear River locks and dams. This has raised concerns over drought management effects on spring anadromous

spawning runs. The drought contingency plan only applies during low flow conditions which typically do not occur during the spring anadromous fish spawning runs. Therefore regardless of the fish passage methods implemented at the Cape Fear River locks and dams, the proposed drought contingency plan should not have any net detrimental effect on anadromous fish spawning.

The maintenance of flow targets is important for fish and wildlife resources in the Cape Fear River below Jordan Dam. Depletion of the water quality pool for downstream flow as a result of drought condition would have significant adverse impacts on downstream fish and wildlife resources.

Proposed Drought Contingency Plan

Implementation of the proposed plan will result in gradual reductions in flow and water quality parameters that may affect aquatic species. Allowing for gradual changes may permit species to adapt to the changing conditions minimizing adverse impacts of a drought situation. Monitoring of water quality parameters and adjustment of target flows at Lillington if necessary should be sufficient to prevent degradation of fisheries habitat. The proposed drought contingency plan would extend the water quality pool for downstream flow and ecosystem for a possible long-term drought.

No Action – 1991 Plan

The current drought contingency plan would not be implemented until later in a drought event. Delayed implementation of the drought contingency plan reduces the ability to effectively manage water in a prolonged drought.

5.04 Endangered Species. The only federally listed endangered species known to inhabit the Jordan Lake property is the American bald eagle (*Haliaeetus leucocephalus*). The Corps of Engineers actively manages for bald eagle within the project area. There are several active bald eagle nest sites within the lake area, but implementation of the drought contingency plan would not adversely affect those sites. Drought conditions may actually aid bald eagle foraging activities by concentrating fish in the remaining pool areas of the lake.

Other endangered species that may be found in the Jordan Lake area are arperella (*Ptilimnium nodosum*), Red-cockaded woodpecker (*Picoides borealis*), Cape Fear shiner (*Notropis mekistocholas*), and Michaux's sumac (*Rhus michauxii*). Harperella, an aquatic plant that occurs in clean, swift moving water is not known to occur in Jordan Lake. There was a Red-cockaded woodpecker colony on Jordan lake property but it has not been active since the 1980's. The colony area has been managed for the potential re-colonization of the site. Michaux's sumac is known to occur in Wake County, but has not been documented on Jordan property.

Listed species in the lower watershed include the Cape Fear shiner (*Notropis mekistocholas*), the shortnose sturgeon (*Acipenser brevirostrum*), pondberry (*Lindera melissifolia*), rough-leaved loosestrife (*Lysimachia asperulifolia*), American chaffseed (*Schwalbea americana*), Cooley's meadowrue (*Thalictrumcooleyi*), and the American alligator

(*Alligator mississippiensis*). Of these species, the most likely to be affected by drought conditions would be the Cape Fear shiner and shortnose sturgeon, primarily due to low flow conditions.

The depletion of water quality storage and the failure to meet low flow targets due to drought conditions would likely adversely impact endangered species in the Cape Fear River downstream of Jordan Dam. Significant reduction of flows resulting from the depletion of water quality storage used for flow releases could potentially strand individuals in areas that would not be conducive to life due to resulting changes in water quality.

Proposed Drought Contingency Plan

The proposed plan would reduce the risk of dramatic changes in flow conditions potentially experienced by Cape Fear shiner and shortnose sturgeon in the river below Jordan Dam. Reductions in flow over time as proposed in the new plan would allow time for these aquatic species to move to areas of deeper water. The monitoring of water quality during plan implementation would allow for corrections to be made before negative impacts to threatened and endangered species occur. The proposed plan would have low risk for adverse impacts to threatened or endangered species in or downstream of Jordan Dam and Lake.

No Action – 1991 Plan

The current plan has little to no reaction time to drought conditions. Implementation of the current plan later in a drought event provides less flexibility for adaptive management that may be protective of threatened and endangered species. Delayed implementation of drought contingency plan releases increase the risk of running out of water in a prolonged drought.

5.05 Recreation. Water-based recreation will be the most likely form of recreational activity likely to be impacted by drought conditions. During drought conditions lake levels have the potential to fall below elevations supportive of boat ramp and swim area use. Should water elevations fall below the end of specific ramps, they may be closed for safety reasons until water levels recover. This would result in a reduction in available access points to boaters desiring to use the lake. The swim areas are designated as such due to the presence of sandy substrate areas that have been cleared of underwater obstructions or other potential hazards. During drought events, the lake level may fall below areas that have been designated as swim areas resulting in their closure. Recreational fishing may be impeded along shoreline areas as lake levels fall due to the presence of exposed mud flats. These areas would become accessible after drying. Angler success may actually be enhanced by low water levels in the lake concentrating fish stocks.

Drought conditions and low water levels also adversely affect downstream recreation. In a severe drought the depletion of water quality storage for low flow target releases would adversely effect recreation by causing water quality impacts and very low water levels in the river.

Proposed Drought Contingency Plan

Implementation of the proposed plan would likely not change the overall effect of drought conditions on recreation. Downstream recreationists would see gradual reductions in water levels. The changing conditions would occur over a period of time. While the drought conditions can adversely effect downstream recreation, no adverse effects on recreation are expected to be directly attributable to implementation of the proposed plan.

No Action – 1991 Plan

The current plan would likely not change the overall effect of drought conditions on recreation. Low water levels caused by drought adversely effect recreation. For downstream recreationists, change due to drought conditions would not be as readily apparent until the plan is implemented later in the drought. The no action alternative (current Drought Contingency Plan), provides for a higher risk of depletion of water quality storage as compared to the proposed plan. This equates to a higher risk of the adverse impacts to recreation under present drought contingency plan as compared to the proposed drought contingency plan.

5.06 Cultural Resources. Cultural resource surveys have been conducted in the Jordan Lake area in 1963, 1964, 1976, 1978, and 1982 (COE, Unpublished data). As a result of the surveys, several sites were found to be eligible for the National List of Historic Places. These include the Haw River Site Complex, the Newkirk Site, the John A. Mason House, the New Hope Rural Historic Archeological District, the Little Creek Archeological Site, and the Wilderness Island (Lasater) Homestead. Reductions in lake levels and river flows may expose cultural resources that may or may not be documented, but restoration of lake and river levels at the end of a drought event would potentially protect those resources.

Proposed Drought Contingency Plan

Implementation of the proposed drought contingency plan would not have adverse affects on any of the sites discussed above. The proposed plan would not adversely affect cultural resources in the Cape Fear River below Jordan Dam.

No Action – 1991 Plan

Continued use of the existing drought contingency plan would not have adverse effects on the sites discussed above.

5.07 Dam Safety Considerations

Dam safety is an integral component of operation of Jordan Dam. Depending on length and severity of drought conditions, monitoring during refilling of the reservoir will be increased to insure safety and integrity of the dam. Factors such as how low water levels fall and duration of drying of the dam embankment will have to be considered. To address these concerns, the Engineering Branch of the Wilmington District and staff at B. Everett Jordan Lake will implement the following during refilling of the reservoir:

Monitoring Plan

Piezometers should continue to be read monthly until the pool has increased 3 ft (starting from El. 242.0 ft, msl). When pool has increased 3 ft (El. 245.0 ft, msl), piezometers should be read every other day until piezometer levels stabilize as determined by Geotechnical personnel. After stabilization, readings should be taken on the monthly schedule until the pool increases another 3 ft. For every 3 ft increase in pool (including for pool levels below starting elevation of 242.0 ft, msl), the piezometers should be read every other day as outlined for the first 3 ft increment until conservation pool capacity (El. 251.5 ft msl) is reached. Visual inspections of dam structures should be made on the same frequency. Should unusual conditions occur, the approved Emergency Action Plan for Jordan Lake will be activated.

Reservoir Regulation

In the event of an intense rain event where pool rises rapidly, the peak pool level obtained will be maintained for three consecutive days or until piezometer levels stabilize as determined by Geotechnical personnel.

6.00 CUMULATIVE EFFECTS

The Council on Environmental Quality's regulations for implementing the National Environmental Policy Act define cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such other actions." (40 CFR § 1508.7) Increases in water needs in the Jordan Lake and downstream area are likely to continue in the future. Drought conditions themselves will likely have adverse cumulative effects on the region. The proposed action and the no action alternatives are water management plans to ameliorate the overall effect of drought conditions in the watershed. Both of the management alternatives may have short term and minor cumulative effects associated with the actions taken to reduce risk of depleting water supplies needed for sustaining flow targets. Implementing either the no action or proposed plan will extend the life of the conservation pool and reduce the overall effects of the drought conditions in the watershed. However, the proposed plan results in less probability of depleting the water quality pool during protracted drought events. Accordingly, neither the proposed action nor the no action water management plan alternatives in combination with reasonably foreseeable future projects are not expected to have significant adverse cumulative effects.

7.00 COORDINATION

This proposed project has been coordinated with Federal, State, and local government agencies and other interested parties through a scoping letter and the State Clearinghouse. A current listing (current as of April 2008) of the stakeholders interested in the Cape Fear River Basin is included in Appendix C. The scoping letter and a list of respondents are included in Appendix C. Comment letters are on file and available for review at the Wilmington District office. During preparation and development of this document, several stakeholders' meetings were attended in Raleigh and Fayetteville to gather comments and recommendations which have been incorporated into the proposed plan. This document will be circulated for a 30-day public review and comment period. When implemented, the plan will continue to be coordinated with the North Carolina Drought Management Advisory Council, of which the Corps is a participating member.

8.00 CONSISTENCY EVALUATION FOR NC COASTAL MANAGEMENT PROGRAM

Implementation of the proposed drought contingency plan will not affect the coastal resources of the Cape Fear River basin. The plan will be coordinated with natural resource agencies and key stakeholders throughout drought events and will be protective of downstream flows and water quality. The plan is consistent with the Approved North Carolina Coastal Management Plan.

9.00 POINT OF CONTACT

Any comments or questions regarding this EA should be addressed to Mr. Stacy Samuelson, Environmental Resources Section, U.S. Army Corps of Engineers, Wilmington District, PO Box 1890, Wilmington, North Carolina 28402-1890.

10.00 FINDING

No significant adverse effects on water and aquatic resources, terrestrial resources, threatened and endangered species, cultural resources and recreational resources are expected to occur as a result of the proposed Drought Contingency Plan for B. Everett Jordan Dam and Lake. The proposed action should not significantly affect the quality of the human environment; therefore; an Environmental Impact Statement (EIS) will not be required. If this determination is upheld following circulation of this EA, a Finding of No Significant Impact (FONSI) will be signed and circulated.

Appendix A
Drought Contingency Plan
February 1991

EXHIBIT B

B. Everett Jordan Lake
Cape Fear River Basin, NC
DROUGHT CONTINGENCY PLAN
February 1991

INTRODUCTION

The purpose of this report is to (1) provide a platform from which to make decisions on implementation of water conservation measures during future droughts, (2) review the operational flexibility of Jordan Water Control Plan in a drought, and (3) address the potential problems associated with an extreme drought. A severe drought in the Cape Fear River basin develops over a fairly long period of time and has a typical duration of 6-12 months. Adequate time will be available to plan specific details of a drought operation. Therefore, this plan is an outline of water management measures and coordination actions to be considered when a severe drought occurs. Details of particular water management measures and the timing of their application will be determined as the drought progresses.

BACKGROUND

Usually, the demand for water is the greatest when the natural supply is the least. Jordan Lake has been drawn below elevation 210 feet m.s.l. on two separate occasions since completion of permanent impoundment on February 4, 1982. During this time period, no water supply withdrawals were made. The only releases were for water quality needs downstream. Table 1 shows the minimum lake elevation for each year since inception of the project.

Minimum Elevations at Jordan Lake Since Permanent Impoundment

Calendar Year	Date	Elevation (ft. m.s.l.)
1982	September 28	213.95
1983	October 23	208.85
1984	November 28	212.55
1985	November 3	213.25
1986	November 12	207.85
1987	November 26	210.60
1988	August 29	210.23
1989	September 16	215.63

These elevations indicate that the 1980 decade was a dry period. The potential for a serious drought did exist in 1983, 1986, and 1988 due to the time of year and the minimum elevation that occurred. Operational experience gained during

these dry periods plus the results from the drought operation of Falls Lake project, in the adjacent Neuse River Basin, were used to develop the drought operational curves on exhibit 1 at the end of this plan. Exhibit 1 is a model guide to follow for monitoring the status of future droughts.

Water supply use by municipalities and industries downstream of Jordan Dam from surface waters as tabulated by U.S. Geological Survey is provided in table 2. This table illustrates that the current volume of water required for water supply is relatively high as compared to the water quality release requirement of 600 c.f.s. (388 MGD) at Lillington, NC.

TABLE 2

Cape Fear River Water Supply Users Below Jordan Dam

Municipality	Source of Supply	Amount of Withdrawal MGD (1987)	Population Served
Vass	Little River	0.14	900
Carthage	Nicks Creek	0.26	1,500
Sanford	Cape Fear River	3.34	18,000
Northeast Metro Water District (Harnett Co.)	Cape Fear River	0.75	5,000
Dunn	Cape Fear River	2.35	9,450
Fayetteville	Cape Fear River	16.25	118,604
Fort Bragg	Little River	7.94	121,828
Wilmington	Cape Fear River	9.72	52,000

Industry	Source of Supply	Average Annual Withdrawal in MGD (1987)
Chembond Corp.	Haw River	0.22
Allied Signal	Haw River	0.32
Moncure Fiberboard Plant	Shaddox Creek	0.34
Sanford Group	Several Ponds	0.08
Elliott Gravel Pit	Several Ponds	0.20
Burlington Industries Erwin Plant	Cape Fear River	2.0
Dupont (Cumberland Co.)	Cape Fear River	9.0
Monsanto (Cumberland Co.)	Cape Fear River	1.3
Cape Fear Feed Products	Cape Fear River	0.05
Federal Paper Board Co.	Cape Fear River	43.25
Wright Chemical Corp.	Livingston Creek	0.2
Dupont (Brunswick Co.)	Cape Fear River	7.3
Occidental Chemical Corp.	Cape Fear River	0.29
Dixie Cement	Cape Fear River (2 intakes)	1.2

Lake access is available during periods of low lake levels. This is illustrated in table 3 which gives the bottom elevation of boat ramps at current and future access areas. The top elevation of boat ramps at Jordan Lake is approximately 227 feet m.s.l. However, operational experience during this period showed that recreational use of the lake began to suffer once the

elevation fell below 212-213 feet m.s.l. Numerous complaints were received at both the Resource Manager's Office and Crosswinds Marina during low elevation periods primarily regarding shoals and navigational hazards within the lake. While the facilities at Crosswinds Marina were designed to function at elevations lower than what occurred, there was very little recreational use observed when Jordan Lake fell below elevation 212 feet m.s.l. Boat ramps at four locations become unusable when the lake level is at elevation 212 feet m.s.l., or two to three feet above the end-of-ramp elevation. Also, at this elevation the swimming beaches become unusable. While recreational use of the lake is significantly impacted at elevation 212 feet m.s.l. and below, serious problems are also encountered at Crosswinds Marina once the elevation drops to 205 feet m.s.l. The problem at Crosswinds Marina evolves around braces on the finger pier system which require approximately 6 feet of water to remain in place.

TABLE 3

Bottom Elevation of Public Boat Ramps at Jordan Lake
February 1991

Location		Bottom of Ramp Elevation (ft. m.s.l.)
Access Currently Available:		
Ebenezer	2 Lanes	202.0
	4 Lanes	206.0
Vista Point	2 Lanes	202.0
	2 Lanes	206.0
Parkers Creek	2 Lanes	205.0
Farrington	2 Lanes	202.0
	2 Lanes	206.0
	2 Lanes	208.0
Crosswinds Ramp	4 Lanes	212.0
	2 Lanes	202.0
Crosswinds Marina	2 Lanes	202.0
	2 Lanes	208.0
Poes Ridge	4 Lanes	210.0
Poplar Point	4 Lanes	210.0
Seaforth	3 Lanes	205.0
	3 Lanes	210.0
Future Access:		
Crosswinds Campground	2 Lanes	207.0
Robeson Creek	1 Lane	202.0
	1 Lane	208.0
New Hope Overlook	2 Lanes	202.0
	4 Lanes	208.0

Note: All boat ramps were constructed prior to impoundment of Jordan Lake, however, all recreation areas have not yet been completed. Ramps generally

become unusable when Jordan Lake level is 2 to 3 feet above the end-of-ramp elevation.

SUMMARY OF EXISTING WATER CONTROL PLAN

The authorized purposes of Jordan Lake are to provide for flood control, water supply, water quality control, recreation, and other purposes. The top of the conservation pool is at elevation 216 feet m.s.l. At that elevation, the mean depth of the lake is 15 feet and the maximum depth is about 66 feet. Allocated storages for Jordan Lake are shown in table 4.

TABLE 4

STORAGE ALLOCATION

	Elevation (Ft, m.s.l.)	Area (Ac.)	Capacity/Feb '80 (Ac-Ft)
Top of flood control pool	240	31,811	753,560
Flood control storage	216-240	-	538,430
Top of conservation pool	216	13,942	215,130
Bottom of conservation pool	202	6,658	74,700
Conservation pool storage	202-216	-	140,430
Water Supply		-	45,830
Water Quality (Low Flow)		-	94,600
Sediment storage	155-202	-	74,700

The plan of operation for Jordan Lake Project provides for maintaining a normal pool at elevation 216 feet m.s.l. on a year round basis. This is accomplished during periods of normal flow by releasing inflow. During flood periods, releases are based on a combination of downstream flow conditions and lake levels to minimize flood damages downstream. During normal and low-flow conditions, flows are released to maintain a target flow between 550 and 600 cubic feet per second (c.f.s.) at the Lillington gage. A minimum instantaneous flow of 40 c.f.s. is maintained immediately below the dam. The conservation pool storage is divided with 67.38 percent allocated for water quality releases downstream and 32.62 percent has been contracted by the State of North Carolina for water supply.

Regulation flexibility is very limited under existing authority. When the lake elevation is in the conservation pool, the project will be operated to meet water supply requirements and water quality low flow releases. The only available flexibility from a regulation viewpoint in this situation would be that the State of North Carolina modify its requirements for water quality releases and/or utilize water supply distributions.

Storage-use flexibility between the conservation and flood control pools is not a viable option within the guidelines authorizing the project. Flexibility within the conservation pool between water supply and water quality would have to be initiated by the State of North Carolina.

ANALYSIS OF DROUGHT OPERATION

Dry periods occur randomly during any time period. There is no major indicator to distinguish "normal" dry periods from severe droughts during the early stages. Conditions may vary slightly depending on the time of year, length of time the lake is below elevation 216 feet m.s.l., and water supply and water quality requirements. However, exhibit 1 and a water budget (which will be generated and maintained by the Wilmington District) outlining water quality and water supply storage remaining will be used to initiate action.

Exhibit 1 is a tool used to initiate action based on the lake elevation as the primary indicator. If the elevation drops into Zone C as shown on exhibit 1 or the remaining water supply or water quality storage volume falls below 45 percent, as indicated by the water budget, then coordination between all concerned parties shall be initiated by the Wilmington District.

The Drought Management Committee shall consist of the Wilmington District and other Federal agencies as required. Advisors to the committee will be representatives from the State of North Carolina, and from local governments. Coordination activities shall include, but not be limited to initiation of the drought contingency plan, alerting recreation interests within the lake, issuing forecasts of water supply and water quality storage remaining, implementing conservation measures, and making public information releases.

The Division of Water Resources with the Department of Environment, Health and Natural Resources will act as the point of contact for the State of North Carolina and as the responsible party for notifying all related concerned interests. The Resource Manager for Jordan Lake will be responsible for notifying all related concerned interests within the lake (marina operation, recreation use areas, etc.) of the current status, forecast of drawdown and performing duties in conjunction with state agencies as described in the "Operational Management Plan" for B. Everett Jordan Lake. Personnel within the Reservoir Regulation Section of the Wilmington District shall prepare a water budget of water supply and water quality storage remaining and a forecast of time remaining at the current usage rate for water quality and for water supply. This forecast and water budget shall be updated as needed and furnished to the Resource Manager at Jordan and the Director of Water Resources with the State.

Public press releases shall be made on an "as-needed" basis through the Public Affairs Office (PAO) in the Wilmington District. These statements shall provide the public with a full explanation of drought operations and forecasts of expected conditions in an effort to reduce inquiries from recreation and concerned interests.

A drought situation report for Jordan and other projects within the Wilmington District shall be prepared as appropriate by the Reservoir Regulation Section of the Wilmington District. This report shall provide detailed information on current and forecast situations for informational purposes of District and South Atlantic Division elements.

DROUGHT MANAGEMENT PLAN

This plan may be initiated by the Chief, Hydrology and Hydraulics Branch of the Wilmington District Corps of Engineers when the elevation at Jordan is in Zone C on exhibit 1. If not previously implemented, this plan shall automatically become operational and remain in effect any time Jordan Lake elevation is in Zone D of exhibit 1.

1. A water budget shall be initiated by the Wilmington District (retroactive to the date that the lake first dropped below elevation 216.0 feet m.s.l.)

2. The State of North Carolina shall be updated by the Wilmington District Corps of Engineers on a weekly basis regarding water quality and water supply storage remaining.

3. When 23 percent of either the water quality or water supply storage remains, the responsible agency shall be notified by the Wilmington District that implementation of water conservation should be considered.

4. Whenever the elevation at Jordan Lake is drawn down to Zone D of exhibit 1, the following action shall be initiated. The Drought Management Committee will convene to discuss a course of action for the continued operation of Jordan and possible alternatives (examples listed in step 5).

5. Once step 4 has been reached, the plan of action will depend on decisions that must be made by the State of North Carolina, since all storage within the conservation pool at Jordan has been allocated to water supply and water quality control. Potential alternatives available to the State of North Carolina once step 4 of the management plan has been met include, but are not limited to, the following:

a. Implement restrictive water use measures for personal and emergency use only (no water for lawns, gardens, pools, car washes, etc.)

b. Temporarily relax state standards for water quality requirements in the river below Jordan to permit continued operation of industrial and municipal waste treatment facilities, and conserve remaining water quality storage.

c. Purchase any surplus water supply storage space for the duration of the drought to supplement water quality storage and/or provide relief in those areas of greatest need.

6. Should the elevation of Jordan Lake fall into Zone E of exhibit 1 or all water supply or water quality storage become depleted, potential alternatives include but are not limited to:

a. Emergency reallocation by the District Engineer in Wilmington of any water that may remain within the sediment storage pool.

b. Declaration by the State of North Carolina of a water emergency as authorized by G.S. 143-354. After a water emergency has been declared by the Environmental Management Commission, the Commission can order emergency diversions to meet the needs of human consumption, necessary sanitation, and public safety. The Division of Water Resources assesses water supply problems and recommends action to the Commission under this statute.

SELECTED FEDERAL EMERGENCY AUTHORITIES PROVIDING DROUGHT ASSISTANCE

The responsibility for providing an adequate supply of water to inhabitants of any area is basically non-Federal. Corps assistance to provide emergency water supplies will only be considered when non-Federal interests have exhausted reasonable means for securing necessary water supplies, including assistance and support from other Federal agencies.

Assistance may be available from the Corps through PL 84-99 as amended by PL 95-51. Before Corps assistance is considered under PL 95-51, the applicability of other Federal assistance authorities should be evaluated. If these programs cannot provide the needed assistance, then maximum coordination should be made with appropriate agencies in implementing Corps assistance. The applicability of programs administered by the following Federal agencies, as a minimum, will be determined prior to consideration of Corps assistance.

1. Small Business Administration (SBA).

2. Farmers Home Administration (FmHA).

3. Economic Development Administration (EDA).

Corps Authority for Drought Assistance

The Corps authority for Drought Assistance is contained in Chapter 6, "Emergency Water Supplies and Drought Assistance" of Engineering Regulation 500-1-1 Natural Disaster Procedures (1983). Under this authority, the Chief of Engineers, acting for the Secretary of the Army, can construct wells and transport water to farmers, ranchers, and political subdivisions within areas determined to be drought-distressed.

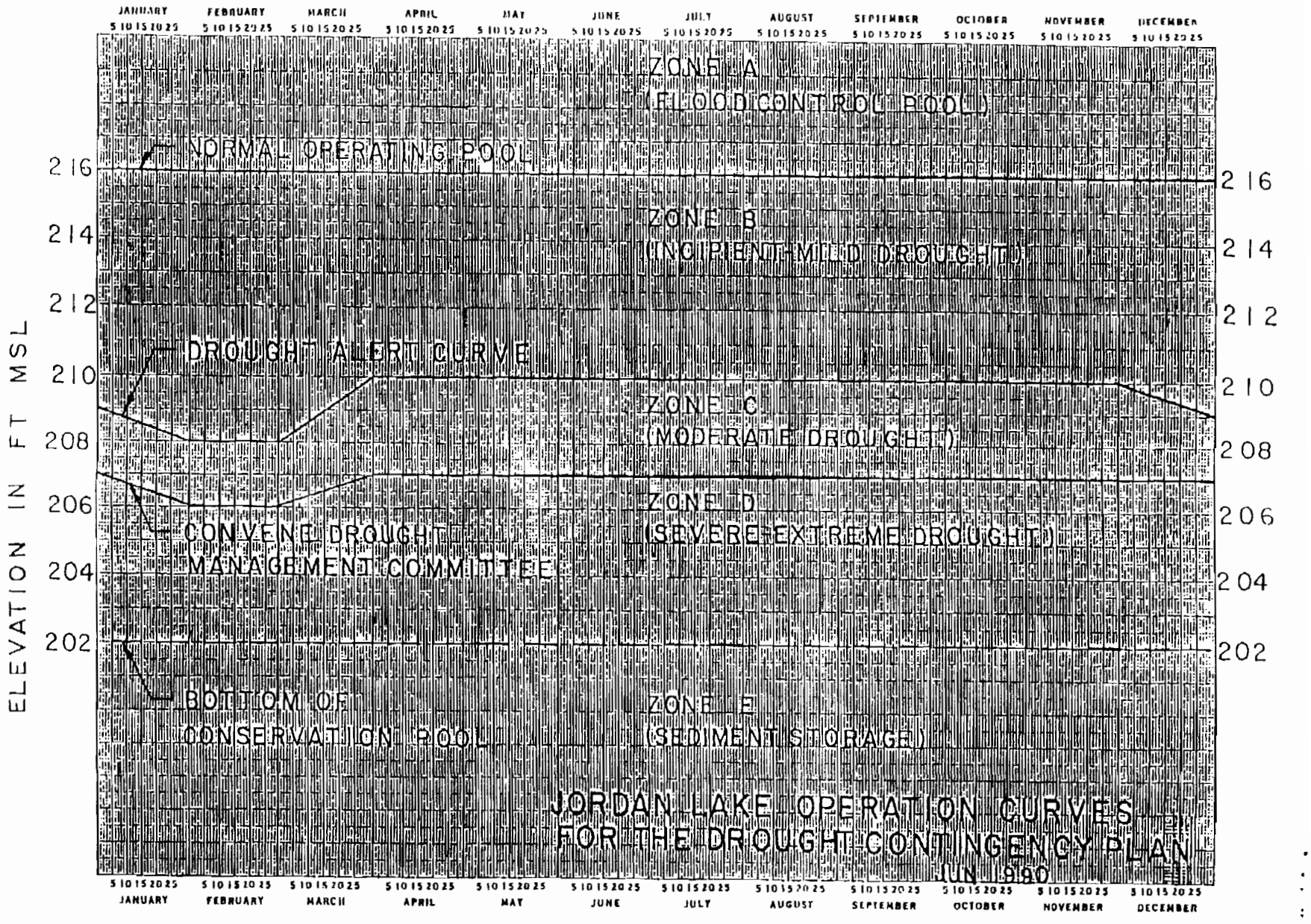


EXHIBIT 1

Appendix B
Drought Contingency Plan
May 2008

EXHIBIT B

B. EVERETT JORDAN LAKE
CAPE FEAR RIVER BASIN, NORTH CAROLINA
DROUGHT CONTINGENCY PLAN
Updated May 2008

INTRODUCTION

The purpose of this report is to (1) provide a platform from which to make decisions on implementation of water conservation measures during future droughts, (2) review the operational flexibility of the Jordan Water Control Plan in a drought, and (3) address the potential problems associated with an extreme drought. A severe drought in the Cape Fear River basin develops over a fairly long period of time and may have a typical duration of 6-12 months. However, the severe drought which climaxed in 2002 may have begun as early as 1996. Adequate time will be available to plan specific details of a drought operation. Therefore, this plan is an outline of water management measures and coordination actions to be considered when a severe drought occurs. Details of particular water management measures and the timing of their application will be determined as the drought progresses. This plan is part of the Water Control Manual for B. Everett Jordan Dam and Lake.

BACKGROUND

Usually, the demand for water is the greatest when the natural supply is the least. Jordan Lake has been drawn below elevation 210 feet, MSL on four separate occasions since completion of permanent impoundment on February 4, 1982. (Normal level is 216 ft, MSL). During this time period, no water supply withdrawals were made. The only releases were for water quality needs downstream. Table 1 shows the minimum lake elevation for each year since inception of the project.

TABLE 1

Minimum Elevation at Jordan Lake Since Permanent Impoundment

Calendar Year	Date	Elevation (ft. MSL)
1982	September 28	213.95
1983	October 23	208.85
1984	November 28	212.55
1985	November 3	213.25
1986	November 12	207.85
1987	November 26	210.60
1988	August 29	210.23
1989	September 16	215.63
1990	October 10	209.59
1991	December 26	212.69
1992	October 29	213.80
1993	November 26	210.80
1994	October 13	214.75
1995	August 26	214.87
1996	July 23	215.18
1997	October 18	213.65
1998	December 8	210.31

1999	August 24	212.56
2000	December 15	212.95
2001	December 31	210.89
2002	August 24	209.87
2003	September 14	215.88
2004	March 22	215.76
2005	November 20	212.13
2006	August 30	215.34
2007	October 24	210.19

These elevations indicate that the 1980 decade was a dry period. The potential for a serious drought did exist in 1983, 1986, and 1988 due to the time of year and the minimum elevation that occurred.

Water supply use from surface waters by municipalities and industries downstream of Jordan Dam as tabulated by the U. S. Geological Survey is provided in table 2. This table illustrates that the current volume of water required for water supply is relatively high as compared to the minimum water quality release requirement of 600 c.f.s. (388 MGD) at Lillington, NC.

TABLE 2

Cape Fear River Water Supply Users Below Jordan Dam

Municipality	Source of Supply	Amount of Withdrawal MGD (1987)	Population Served
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Dunn	Cape Fear River	2.35	9,450
Fayetteville	Cape Fear River	16.25	118,604
Fort Bragg	Little River	7.94	121,828
Wilmington	Cape Fear River	9.72	52,000

Industry	Source of Supply	Average Annual Withdrawal in MGD
Chembond Corp.	Haw River	0.22
Allied Signal	Haw River	0.32
Moncure Fiberboard Plant	Shaddox Creek	0.34
Sanford Group	Several Ponds	0.08
Elliott Gravel Pit	Several Ponds	0.20
Burlington Industries Erwin Plant	Cape Fear River	2.0
Dupont (Cumberland Co.)	Cape Fear River	9.0
Monsanto (Cumberland Co.)	Cape Fear River	1.3
Cape Fear Feed Products	Cape Fear River	0.05
Federal Paper Board Co.	Cape Fear River	43.25
Wright Chemical Corp	Livingston Creek	0.2
Dupont (Brunswick Co.)	Cape Fear River	7.3
Occidental Chemical Corp.	Cape Fear River	0.29
Dixie Cement	Cape Fear River (2 intakes)	1.2

Lake access is available during periods of low lake levels. This is illustrated in table 3 which gives the bottom elevation of boat ramps at current and future access areas. The top elevation of boat ramps at Jordan Lake is approximately 227 feet MSL. However, operational experience during this period showed that recreational use of the lake began to suffer once the elevation fell below 212-213 feet MSL. Numerous complaints were received at both the Resource Manager's Office and Crosswinds Marina during low elevation periods primarily regarding shoals and navigational hazards within the lake. While the facilities at Crosswinds Marina were designed to function at elevations lower than what occurred, there was very little recreational use observed when Jordan Lake fell below elevation 212 feet MSL. While recreational use of the lake is significantly impacted at elevation 212 feet MSL and below, serious problems are also encountered at Crosswinds Marina once the elevation drops to 205.0 MSL. The problem at Crosswinds Marina is the bracings on the finger pier system which require approximately 6 feet of water to remain in place.

TABLE 3

Bottom Elevation of Public Boat Ramps at Jordan Lake
January 1989

Location		Bottom of Ramp Elevation (ft. MSL)
Access Currently Available:		
Ebenezer	2 Lanes	202.0
	2 Lanes	206.0
Vista Point	2 Lanes	202.0
	2 Lanes	206.0
Parkers Creek	2 Lanes	205.0
Farrington	2 Lanes	202.0
	2 Lanes	206.0
	2 Lanes	208.0
Crosswinds Ramp	4 Lanes	212.0
	2 Lanes	202.0
Crosswinds Marina	2 Lanes	202.0
	2 Lanes	208.0
Poes Ridge	4 Lanes	210.0
Future Access:		
Poplar Point	4 Lanes	210.0
Seaforth	3 Lanes	205.0
	3 Lanes	210.0
Crosswinds Campground	2 Lanes	207.0
Robeson Creek	1 Lane	202.0
	1 Lane	208.0
New Hope Overlook	2 Lanes	202.0
	4 Lanes	208.0

Note: All boat ramps were constructed prior to impoundment of Jordan Lake, however, all recreation areas have not yet been completed. The top elevation of all ramps is approximately 227 feet, MSL.

SUMMARY OF EXISTING WATER CONTROL PLAN

The authorized purposes of Jordan Lake are to provide for flood control, water supply, water quality control, recreation, and other purposes. The top of the conservation pool is at elevation 216.0 feet MSL. At that elevation, the mean depth of the lake is 15 feet and the maximum depth is about 66 feet. Allocated storages for Jordan Lake are shown in table 4.

TABLE 4

Storage Allocation

	Elevation (Ft. MSL)	Area (Ac.)	Capacity/Jun85 (Ac-Ft)
Top of flood control pool	240	31,811	753,560
Flood control storage	216-240	-	538,430
Top of conservation pool	216	13,942	215,130
Bottom of conservation pool	202	6,658	74,700
Conservation pool storage	202-216	-	140,430
Water Supply		-	45,810
Water Quality (Low Flow)		-	94,620
Sediment storage	155-202	-	74,700

The plan of operation for Jordan Lake project provides for maintaining a normal pool at elevation 216 feet MSL. on a year round basis. This is accomplished during periods of normal flow by releasing inflow. During flood periods, releases are based on a combination of downstream flow conditions and lake levels to minimize flood damages downstream. During normal and low-flow conditions, flows are released to maintain a target flow between 550 and 650 cubic feet per second (c.f.s.) at the Lillington gage. A minimum instantaneous flow of 40 c.f.s. is maintained immediately below the dam. The conservation pool storage is divided with 67.38 percent allocated for water quality releases downstream and 32.62 percent contracted by the State of North Carolina for water supply.

Regulation flexibility is very limited under existing authority. When the lake elevation is in the conservation pool, the project will be operated to meet water supply requirements and water quality low flow releases. The only available flexibility from a regulation viewpoint in this situation would be that the State of North Carolina water quality release requirements and/or water supply withdrawals.

Storage-use flexibility between the conservation and flood control pools is not a viable option within the guidelines authorizing the project. Flexibility within the conservation pool between water supply and water quality would have to be initiated and addressed by the State of North Carolina.

ANALYSIS OF DROUGHT OPERATION

Dry periods occur randomly during any time period. There is no major indicator to distinguish "normal" dry periods from severe droughts during the early stages. Conditions may vary slightly depending on the time of year, length of time the lake is below elevation 216 feet MSL, and water supply and water quality requirements. However, a water budget (which will be generated

and maintained by the Wilmington District) outlining water quality and water supply storage remaining will be used to initiate action.

The Drought Management Committee shall consist of the Wilmington District and other Federal agencies as required. Advisors to the committee will be representatives from the State of North Carolina, and local governments. Coordination activities shall include but not be limited to initiation of the Drought Contingency Plan, alerting recreation interests within the lake, issuing forecasts of water supply and water quality storage remaining, implementing conservation measures, and making public information releases.

The Division of Water Resources with the Department of Environment, Health, and Natural Resources will act as the point of contact for the State of North Carolina, and as the responsible party for notifying all related concerned interests. The Resource Manager for Jordan Lake will be responsible for notifying all related concerned interests within the lake (marina operation, recreation use areas, etc.) of the current status, forecast of drawdown and for performing duties in conjunction with state agencies as described in the "Operational Management Plan" for B. Everett Jordan Lake. Wilmington District Water Management personnel shall prepare a water budget consisting of water supply, water quality storage remaining and a forecast of time remaining at the current usage rate for water quality and water supply. This forecast and water budget shall be updated as needed and furnished to the Resource Manager at Jordan Lake and the Director of Water Resources with the State.

Public press releases shall be made on an "as-needed" basis through the Public Affairs Office (PAO) in the Wilmington District. These statements shall provide the public with a full explanation of drought operations and forecasts of expected conditions in an effort to reduce inquiries from recreation and concerned interests.

A drought situation report for Jordan and other projects within the Wilmington District shall be prepared as appropriate by the Reservoir Regulation Section of the Wilmington District. This report shall provide detailed information on current and forecast situations for informational purposes of District and South Atlantic Division elements.

DROUGHT MANAGEMENT PLAN

This plan may be initiated by the Chief, Coastal, Hydrology and Hydraulics Section of the Wilmington District Corps of Engineers when the elevation at Jordan is below 216 ft., MSL. The Drought Management Plan focuses on waters contained in the conservation pool (202-216 ft, MSL) of Jordan Lake. The said conservation pool contains water to meet congressionally approved water supply and water quality commitments. The Drought Management Plan emphasizes increased coordination and consultation with stakeholders when either water supply or water quality pool storage declines to 80 percent remaining. Dependent upon climate forecasts and projections of storages remaining, water conservation measures can also be recommended at that time. Due to capacity and outflow requirements, the water quality pool is the controlling entity in management of the lake levels.

The drought release schedule from Jordan Dam is listed in the table 5 below.

Table 5

Drought Level	Water Quality Storage Remaining (%)	Jordan Dam Minimum Release (cfs)	Jordan Dam Maximum Release (cfs)	Lillington Daily Average Flow Target (cfs)	Suggested Water Supply Conservation Status
0	>= 80	40	600	600 +/- 50	Normal
1	60 - 80	40	Lillington target	450 - 600 +/- 50	Voluntary
2	40 - 60	40	Lillington target	300 - 450 +/- 50	Mandatory
3	20 - 40	200		None**	Mandatory, but Emergency at 30%
4	00 - 20	100*		None**	Emergency

* Releases may be increased to 200 cfs if water supply has been reallocated to water quality storage.
** Lillington flow will be total of Jordan Dam release plus local inflow.

1. A water budget shall be initiated by the Wilmington District (retroactive to the date that the lake first dropped below elevation 216.0 feet MSL). The State of North Carolina shall be updated by the Wilmington District, U.S. Army Corps of Engineers, on a weekly basis regarding water quality and water supply storage remaining. Based on the budget and storage remaining the following operations from BE Jordan Dam and Lake will be taken:

A. Drought level 0, flow target at Lillington remains at 600 +/- 50 cfs
B. Drought level 1, flow target at Lillington 450 - 600 +/- 50 cfs
C. Drought level 2, flow target at Lillington 300 - 450 +/- 50 cfs
D. Drought level 3, no flow target set at Lillington. A release rate of 200 cfs from BE Jordan Dam and Lake.
E. Drought level 4, no flow target set at Lillington. A release rate of 100 cfs from BE Jordan Dam and Lake, but may be increased to 200 cfs if water supply is reallocated by the State.

Note that for drought levels 0-2 the flow target is a range of flow targets at Lillington. The range of flows area the result of collaboration and coordination on a variety of parameters such as stakeholder input, short and long term weather outlook, project gate status, influences on stream flows downstream, and local inflows to both Jordan Lake and reaches below the dam. In addition the minimal flows immediately below BE Jordan Dam and Lake is 40 cfs for drought levels 0- 2.

Note for drought level 3 - 4 no flow target is set for Lillington. The flow rate is set from BE Jordan Dam and Lake.

For all release modes listed, in table 5 above, the release operation will be made for a minimum of seven (7) days in conjunction with the monitoring of the river system, made by NCDWQ and other agencies.

Conversely, with increasing lake levels, the sequence of operation will be reversed with consideration of watershed inflows, precipitation forecasts, or other factors with appropriate stakeholder consultation.

2. Once drought level 4 has passed and no water quality storage remains, the plan of action will depend on decisions that must be made by the State of North Carolina, since all storage within the conservation pool at Jordan Lake has been allocated to water supply and water quality control. Potential alternatives available to the State of North Carolina once drought level 4 of the management plan has been met include, but are not limited to, the following:

a. Implement restrictive water use measures for personal and emergency use only (no water for lawns, gardens, pools, car washes, etc.)

b. Temporarily relax State standards for water quality requirements in the river below Jordan Lake to permit continued operation of industrial and municipal waste treatment facilities, and conserve remaining water quality storage.

c. Reallocate if any surplus water supply storage space for the duration of the drought to supplement water quality storage and/or provide relief in those areas of greatest need.

3. Should the elevation of Jordan Lake fall below lake elevation 202 ft, MSL or all water supply or water quality storage become depleted, potential alternatives include but are not limited to:

a. Emergency reallocation(s) by the Corps under PL 78-534 of remaining storage volume within the Sediment Pool.

b. Declaration by the State of North Carolina of a water emergency as authorized by G.S. 143-354. After a water emergency has been declared by the Environmental Management Commission, the Commission can order emergency diversions to meet the needs of human consumption, necessary sanitation, and public safety. The Division of Water Resources assesses water supply problems and recommends action to the Commission under this statute.

SELECTED FEDERAL EMERGENCY AUTHORITIES PROVIDING DROUGHT ASSISTANCE

The responsibility for providing an adequate supply of water to inhabitants of any area is basically non-Federal. Corps assistance to provide emergency water supplies will only be considered when non-Federal interests have exhausted reasonable means for securing necessary water supplies, including assistance and support from other Federal agencies.

Assistance may be available from the Corps through PL 84-99 as amended by PL 95-51. Before Corps assistance is considered under PL 95-51, the applicability of other Federal assistance authorities should be evaluated. If these programs cannot provide the needed assistance, then maximum coordination should be made with appropriate agencies in implementing Corps assistance. The applicability of programs administered by the following Federal agencies, as a minimum, will be determined prior to consideration of Corps assistance.

1. Small Business Administration (SBA).

2. Farmers Home Administration (FmHA).

3. Economic Development Administration (EDA).

Corps Authority for Drought Assistance

The Corps authority for Drought Assistance is contained in Chapter 6, "Emergency Water Supplies and Drought Assistance" of Engineering Regulation 500-1-1 Natural Disaster Procedures (1983). Under this authority, the Chief of Engineers, acting for the Secretary of the Army, can construct wells and transport water to farmers, ranchers, and political subdivisions within areas he determines to be drought-distressed.

Appendix C
Scoping Letter and Respondents

Water Management Stakeholder List

City of Raleigh, Public Utilities Department
NCDENR, Water Resources Division
City of Goldsboro, Public Utilities Department
NCDENR, Division of Water Quality
Johnston County, Department of Public Works
North Carolina Wildlife Resources Commission
United States Fish and Wildlife Service
Weyerhaeuser Corporation
Progress Energy, Carolinas, Incorporated
City of Durham, Public Utilities Department
United States Geological Survey
United States Corps of Engineers, Wilmington District
United States Department of Agriculture, National Agricultural Statistics Service
International Paper Corporation
The Nature Conservancy, North Carolina
Roanoke River Partners
American Electric Power
Duke Energy
Dominion Power
Roanoke River Basin Association
Harnett County, Department of Public Works
City of Fayetteville, Public Utilities Department
City of Smithfield, Public Utilities Department
City of Henderson, Public Utilities Department
Town of Cary, Public Utilities Department
Henry County, Department of Public Works
National Oceanic and Atmospheric Administration
Neuse Regional Water and Sewer Authority
City of Kinston, Public Utilities Department
City of Sanford, Public Utilities Department

Respondents

State Agencies:

NCDENR Division of Coastal Management

North Carolina Department of Administration – State Clearinghouse

NCDENR Division of Environmental Health

North Carolina Department of Cultural Resources

NCDENR Division of Water Resources

NCDENR Division of Water Quality

NCDENR Division of Parks and Recreation

North Carolina Wildlife Resources Commission

Federal Agencies:

United States Department of Agriculture, Natural Resources Conservation Service

United States Department of Interior, Fish and Wildlife Service